calculates the drag the particles experience under the influence of the shaping air, gravity, and electric potential. Paint particle trajectories can then be calculated and paint transfer efficiency determined. Miller et al. does not disclose spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model.

In contradistinction, claim 1 claims the present invention as a system for designing a vehicle by enabling dynamic placement of paint spray particles into a flow domain to permit visual observation and alteration of resulting particle trajectories under a computed flow solution over a computer aided design (CAD) model representative of a desired portion of the vehicle represented on a display by a computer having memory, a processor and a user input mechanism associated therewith. The system includes spray gun placement code means operable with the user input mechanism to dynamically effect a desired placement of at least one paint spray gun on the display with respect to the desired portion of the CAD model. The system also includes trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. The system further includes trajectory display code means for effecting display of the at least one trajectory with respect to the desired portion of the CAD model. Claims 5 and 6 are similar to claim 1 and include other features of the present invention.

A rejection grounded on anticipation under 35 U.S.C. § 102 is proper only where the subject matter claimed is identically disclosed or described in a reference. In other words, anticipation requires the presence of a single prior art reference which discloses each and every element of the claimed invention arranged as in the claim. In re Arkley, 455 F.2d 586, 172 U.S.P.Q. 524 (C.C.P.A. 1972); Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 218 U.S.P.Q.

781 (Fed. Cir. 1983); Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 U.S.P.Q. 481 (Fed. Cir. 1984).

Miller et al. '291 does not disclose the claimed invention of claims 1 through 6. Specifically, Miller et al. '291 merely discloses transient CFD simulations of a bell sprayer in which two numerical models are required in order to analyze the effect of paint transfer efficiency under varying bell operation conditions. Miller et al. '291 lacks spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model. In Miller et al. '291, the SAE paper merely describes transient CFD simulations of a bell sprayer, but not how to use the bell sprayer or the logic behind its use as claimed by Applicants. Miller et al. '291 fails to disclose the combination of a paint spray particle trajectory analysis method and system including spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions as claimed by Applicants. Miller et al. '291 fails to disclose each and every element of the claimed combination of a paint spray particle trajectory analysis method and system as arranged in the claims and claimed by Applicants. As a result, the Miller et al. '291 paper cannot be an anticipatory reference under 102(b) to claims 1 through 6 of the present application. Therefore, it is respectfully submitted that claims 1 through 6 are allowable over the rejection under 35 U.S.C. § 102(b).

Claims 1 through 6 were rejected under 35 U.S.C. § 102(e) as being anticipated by Strumolo et al. (U.S. Patent No. 6,263,300). Applicants respectfully traverse this rejection.

Counsel for Applicants has filed a Continued Prosecution Application along with this Preliminary Amendment. The subject matter of Strumolo et al. '300 and the claimed invention of the present application were, at the time the invention was made, owned by or subject to an obligation of assignment to the same entity, Ford Global Technologies, Inc. As a result, Strumolo et al. '300 cannot qualify as prior art under 35 U.S.C. § 102(e). Therefore, it is respectfully submitted that claims 1 through 6 are allowable over the rejection under 35 U.S.C. § 102(e).

Claims 1 through 6 were rejected under 35 U.S.C. § 103 as being unpatentable over Kinema/SIM (ArSciMed, 1996) in view of Strumolo (U.S. Patent No. 5,568,404) or Miller et al. '291. Applicants respectfully traverse this rejection.

Kinema/SIM Manual from ArSciMed discloses an interactive software tool that presents a simulation space where you can construct and animate complex physical phenomena. The basic building blocks are particles, sources, and obstacles. Kinema/SIM does not disclose spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions.

U.S. Patent No. 5,568,404 to Strumolo discloses a method and system for predicting sound pressure levels within a vehicle due to wind noise. The system and method includes a wind noise modeler, which is implemented as an Excel spreadsheet that runs on a PC. Strumolo does not disclose spray gun placement code means operable with the user input mechanism to dynamically effect a desired placement of at least one paint spray gun on the

display with respect to the desired portion of the CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions.

In contradistinction, claim 1 claims the present invention as a system for designing a vehicle by enabling dynamic placement of paint spray particles into a flow domain to permit visual observation and alteration of resulting particle trajectories under a computed flow solution over a computer aided design (CAD) model representative of a desired portion of the vehicle represented on a display by a computer having memory, a processor and a user input mechanism associated therewith. The system includes spray gun placement code means operable with the user input mechanism to dynamically effect a desired placement of at least one paint spray gun on the display with respect to the desired portion of the CAD model. The system also includes trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. The system further includes trajectory display code means for effecting display of the at least one trajectory with respect to the desired portion of the CAD model. Claims 5 and 6 are similar to claim 1 and include other features of the present invention.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore

Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that "[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) ("In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.")

None of the references cited, either alone or in combination with each other, teach or suggest the claimed invention of claims 1 through 6. Specifically, Kinema/SIM merely discloses an interactive software tool that presents a simulation space where you can construct and animate complex physical phenomena. Kinema/SIM does not disclose spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. The Examiner even admits on page 9 of the Office Action that Kinema/SIM does not teach simulating paint droplet particle flow past an automobile. Strumolo '404 merely discloses a method and system for predicting sound pressure levels within a vehicle due to wind noise including a wind noise modeler, which is implemented as an Excel spreadsheet that runs on a PC. Strumolo '404 lacks spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to

a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. The Examiner even admits on page 9 of the Office Action that Strumolo et al. '404 does not teach particle trajectories of paint droplets. Miller et al. '291 merely discloses transient CFD simulations of a bell sprayer in which two numerical models are required in order to analyze the effect of paint transfer efficiency under varying bell operation conditions. Miller et al. '291 lacks spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model. There is no motivation in the art to combine Kinema/SIM and Strumolo et al. '404 and Miller et al. '291 together.

Contrary to the Examiner's opinion, Applicants are not claiming an intended use for the present invention. There is absolutely no teaching or suggestion in the art that to provide spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. The Examiner may not, because he/she doubts that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis. See In re Warner, 379 F. 2d 1011, 154 U.S.P.Q. 173 (C.C.P.A. 1967).

The references, if combinable, fail to teach or suggest the combination of a paint spray particle trajectory analysis method and system including spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions as claimed by Applicants.

Even if these references could be combined, neither teaches spray gun placement code means operable with a user input mechanism to dynamically effect a desired placement of at least one paint spray gun on a display with respect to a desired portion of a CAD model and trajectory determination code means for computing at least one trajectory for a particle stream emanating from the at least one paint spray gun relative to the desired portion of the CAD model for a predetermined set of particle characteristics in a predetermined set of particle external conditions. Applicants are not attacking the references individually, but are clearly pointing out that each reference is deficient and, if combined (although Applicants maintain that they are not combinable), the combination is deficient. The present invention sets forth a unique and non-obvious combination of a method and system that enables dynamic placement of a paint spray gun into a flow domain to permit visual observation and alteration of resulting paint particle trajectories with respect to a CAD model representative of the vehicle. Therefore, it is respectfully submitted that claims 1 through 6 are allowable over the rejection under 35 U.S.C. § 103.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion

of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejection of claims 1 through 6 is improper. Therefore, it is respectfully submitted that claims 1 through 6 are allowable over the rejection under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance, which allowance is solicited.

Respectfully submitted,

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